M/035/015

State of Utah

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER QUALITY

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Governor

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December 21, 1995

Mr. Robert E. Dunne, Project Manager
Tailings Modernization Project
Kennecott Utah Copper Corporation
11984 West Highway 202
Magna, Utah 84044

SUBJECT: Final Permit; Kennecott Tailings Impoundment; Ground Water Discharge Permit No. UGW350011

Dear Mr. Dunne:

Attached, please find the final approved Ground Water Discharge Permit for the Kennecott Tailings Impoundment. There were no comments received in response to the Division's public notice for the draft permit.

The time frame for the compliance conditions included in this permit will initiate from the effective date of the permit. The permit fee for this action is covered under the terms of our Memorandum of Agreement for permit fees.

Please feel free to contact John Whitehead if there are any questions on this approval. Thank you for your cooperation in this matter.

Sincerely,

Utah Water Quality Board

Don A. Ostler, P.E.
Executive Secretary

DAO:JW:wfm

Enclosures

cc: Michael Schwinn, U.S. Army Corp of Engineers (w/encl)
Wayne Hedberg, DOGM (w/encl)
Brent Everett, DERR (w/o encl)
Terry Sadler, Salt Lake County Health (w/o encl)

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FILE:KENNECOTT TAILINGS IMPOUNDMENT

Permit No.: UGW350011

STATE OF UTAH
DIVISION OF WATER QUALITY
UTAH WATER QUALITY BOARD
SALT LAKE CITY, UTAH 84114-4870

GROUND WATER DISCHARGE PERMIT

In compliance with the provisions of the Utah Water Quality Act, Title 19, Chapter 5, Utah Code Annotated 1953, as amended, the Act,

KENNECOTT UTAH COPPER CORPORATION
8315 WEST 3595 SOUTH
P.O. BOX 6001
MAGNA, UTAH 84044-6001

is granted a ground water discharge permit for the operation of the **Tailings Impoundment** in Salt Lake County, Utah.

The Tailings Impoundment is located on the following tract of land (Salt Lake Base and Meridian):

Township 1 South, Range 2 West - Portions of Sections 5,6,7,8,9,17,18,19, and 20
Township 1 South, Range 3 West - Portions of Sections 1,2,3,10,11,12,13,14,15,23,24
Township 1 North, Range 2 West - Portions of Section 31
Township 1 North, Range 3 West - Portions of Section 35 and 36

The permit is based on representations made by the permittee and other information contained in the administrative record. It is the responsibility of the permittee to read and understand all provisions of this permit.

The facility shall be constructed and operated in accordance with conditions set forth in the permit and the Utah Ground Water Quality Protection Regulations.

This permit shall become effective on December 21, 1995.

This permit and the authorization to operate shall expire at midnight, December 21, 2000.

Signed this 21st day of December 1995.

Executive Secretary
Utah Water Quality Board

Table of Contents

I. SPECIFIC PERMIT CONDITIONS

A. Ground Water Classification

The ground water classification for the uppermost aquifer in the area of the Tailings Impoundment ranges from Class II to Class IV ground water, with water near the Oquirrh Mountains generally Class II and water adjacent to the Great Salt Lake generally Class IV. Ground water at each compliance monitoring well has been classified based on historical monitoring data.

B. Ground Water Protection Levels

Ground Water Protection Levels for compliance monitoring wells for this permit are represented in Table 1. Protection levels for the new and replacement compliance monitoring wells approved in the November 20, 1995 letter from the Division will be set following collection of 12 monthly samples in accordance with the administrative procedures of Part IV.

C. Best Available Technology Performance Standard

1. The Best Available Technology for the Tailings Impoundment will be a Discharge Minimization approach designed, constructed and operated in accordance with the approved designs and specifications (Part I Section F).

2. Only Mine Waste materials that originate from the Bingham Canyon Mine and related processing waste may be disposed of in either the existing or expansion area of the Tailings Impoundment unless prior approval for disposal of other waste streams is obtained from the Executive Secretary.

   Existing Impoundment - The Lake Bonneville Clay (Bonneville Clay) is a lacustrine clay layer varying from 9 to 15 feet thick with low permeability that underlies over 90% of the existing impoundment. The Bonneville clay will act as a liner for the impoundment. A radial discharge capture ditch system exists for much of the existing impoundment to route lateral seepage from the tails back into the process water network for recycle or for discharge under UPDES Permit No. UT0000051.

North Expansion - The entire North Expansion area is underlain by the Bonneville Clay layer. This low permeability lacustrine clay layer will serve as a liner for the North Expansion. A 36 inch blanket drain consisting of drain rock placed between filter material will be placed in the base of the impoundment. This drain layer will reduce water levels in the tailings adjacent to the embankment and reduce, somewhat, the potential for vertical migration of tailings waters. A collection ditch around the perimeter of the North Expansion portion of the Tailings Impoundment will be utilized to capture lateral seepage from the blanket drain and route waters back into the process water makeup system. To assure the ditch forms a ground water low, the water level in the ditch will be kept below natural ground water levels in the vicinity of the ditch except during heavy precipitation or flood events.

Diving Board Area - This area is contained by earthen dikes composed of low permeability native materials and is underlain by the low permeability lacustrine clays typical of this area.

3. Closure
Both the existing and expansion portions of the Tailings Impoundment shall undergo closure in accordance with the requirements of the approved closure plan submitted in response to Part I Section K Item 9.

D. Permitted Facilities

The Facilities authorized under this permit include:

1. The existing Kennecott Tailings Impoundment near Magna Utah

2. The North Expansion of the Tailings Impoundment

3. The Diving Board Area located south of State Road 201, east of the Kennecott North Concentrator and west of 9180 West.

E. Permitted Inflow Waste Streams

The waste streams that are permitted for placement in the existing and expansion portion of the Tailings Impoundment include:

- Copper Tailings from the Copperton Concentrator

- Copper Tailings from the North Concentrator
- Slag Tailings from the slag concentrator at the Smelter
- Power Plant ash slurry
- Construction, maintenance and lunchroom trash
- Waste-water effluent slurry from the Hydrometalurgical Plant at the Smelter
- Other flows that are approved by the Executive Secretary for this permit

(The application of biosolids to the embankments of the impoundment is not considered an inflow and thus is not regulated under this permit)

Kennecott shall obtain approval from the Executive Secretary prior to disposing of mine waste from ore, concentrate, or other materials that do not originate in the Bingham Canyon Mine. The use of off site reagents or materials to process ore, slag, or other materials does not trigger this requirement. The request to dispose of off site materials shall include characterization of the wastes using the Synthetic Precipitation Leaching Procedure (EPA SW846 Method 1312) for mining waste streams and the Toxicity Characteristic Leaching Procedure (EPA SW846 Method 1311) for non-mining waste streams. Further analysis may be required by the Executive Secretary to adequately characterize off site materials.

F. Design and Construction - North Expansion

1. The North Expansion Area of the Tailings Pond will be constructed according to the design specifications and drawings submitted to the Division for the Tailings Impoundment (Initial Application 11-5-93, Addendum Application 5-3-94, Toe Drain and Ditch drawings and cross Sections 5-20-94), the construction permit issued by the Division 6-7-95, and plans and specifications submitted by Kennecott in response to Part I, Section K, Item 8 of this permit. (Kennecott may submit updated drawings that will supersede those referenced above upon approval by the Executive Secretary)

2. In the expansion area, small areas of the Bonneville Clay proposed for liner have been incised by surface water drainages. These areas will be backfilled with comparable liner material in accordance with the approved plan submitted in response to Part I Section K Item 5 of this permit.

3. The blanket drain to be placed in the base of the embankment will be constructed in accordance with the detailed plans and specifications approved by the Utah State Engineer.

G. Monitoring

1. General Provisions

a) *Future Modification of the Monitoring Network* - If at any time the Executive Secretary determines the monitoring program to be inadequate, Kennecott shall submit within 30 days of receipt of written notice from the Executive Secretary a modified monitoring plan that addresses the inadequacies noted by the Executive Secretary.

b) *Compliance Monitoring Period* - Monitoring shall commence upon issuance of this permit and shall continue through the life of this permit. For compliance monitoring wells that are installed during the term of this permit, monitoring shall commence upon completion of the well installation and development.

c) *Laboratory Approval* - All water quality analyses shall be performed by a laboratory certified by the State of Utah to perform such analysis.

d) *Water Level Measurement* - In association with each well sampling event, water level measurements shall be made in each monitoring well prior to removal of any water from the well bore. These measurements will be made from a permanent single reference point clearly marked on the top of the well or surface casing. Measurements will be made to the nearest 0.01 foot.

e) *Sampling Protocol* - Water quality samples will be collected, handled and analyzed in conformance with the currently approved version of the Kennecott Ground Water Characterization and Monitoring Plan.

f) *Constituents Sampled* - The following analysis shall be performed on all water monitoring samples collected:

i) Field Measurements: pH, specific conductance, temperature
ii) Laboratory Analysis:

- Major Ions: (chloride, sulfate, alkalinity, sodium, potassium, magnesium, and calcium)
- TDS
- Metals (dissolved): (arsenic, barium, cadmium, chromium, copper, lead, selenium, silver, zinc)
- Radionuclides: (Uranium, Radium 226, Radium 228, Gross Alpha, and Beta Particle for NET 640 A&B (until abandoned), NET 1393 A&B, and NET 1386 A&B)

2. Operational Monitoring

Operational Monitoring will be used to assure inflows and interstitial waters are consistent with the approved BAT performance standards for this permit.

a) Tailings Waters - Kennecott shall characterize the quality of tailings waters by monitoring interstitial waters (within the Tailings), water from the top of the impoundment, and other outflows such as seeps in accordance with the Operational Monitoring Plan approved in response to item 6 Section K Part I of this permit.

b) Monitoring of Inflows - Each inflow to the Tailings Impoundment listed in Section I Part E except solid waste such as Construction, maintenance and lunch room trash, shall be characterized using at a minimum the Toxicity Characteristic Leaching Procedure (TCLP) or the Synthetic Precipitation Leaching Procedure (SPLP)

(EPA SW846 Methods 1311 and 1312) and total metals analysis. The details for monitoring of inflows will be described in the Operational Monitoring Plan (Appendix B).

c) Kennecott shall perform ongoing monitoring of tailings materials as well as each Copper Tailings Inflow (Copperton and North Concentrators) for acid generation potential.

These characterizations shall be performed in accordance with the approved Operational Monitoring Plan submitted in response to Part I Section K Item 6 of this permit.

3. Monitoring Frequency

a) *Well Monitoring Frequency* - All existing compliance monitoring wells will be sampled quarterly throughout the term of this permit. All new and replacement compliance monitoring wells will be sampled monthly for 12 consecutive months following installation to establish baseline ground water quality. Following completion of 12 monthly samples, monitoring may change to a quarterly sampling frequency.

b) *Operational Monitoring Frequency* - Operational monitoring including monitoring of inflows shall occur semi annually throughout the term of this permit .

H. Non- Compliance for Ground Water Protection Levels

1. Probable Out of Compliance - If the concentration of any pollutant exceeds the Compliance Limit (Table 1) in any compliance monitoring well, Kennecott shall:

a. Notify the Executive Secretary within 30 days of receipt of the data;

b. Initiate monthly sampling for the well(s) that have exceeded the Compliance Limit, unless the Executive Secretary determines that other periodic sampling is appropriate, for a period of two months or until the compliance status of the facility can be determined.

2. Out of Compliance Status

Out of compliance status exists when:

a. Two or more consecutive samples from a compliance monitoring well exceed one or more protection levels; and

b. Two or more consecutive samples from a compliance monitoring well exceed the compliance limit (see Table 1) for that pollutant by two standard deviations for that well: or

The concentration of any pollutant in two or more consecutive samples is statistically significantly higher than the applicable protection level. Statistical significance shall be determined using methods described in Statistical Methods for Evaluating Ground Water Monitoring Data from Hazardous Waste Facilities, Vol. 53, No. 196 (Federal Register, Oct. 11, 1988)

c. Upon determining that an out of compliance situation exists, Kennecott shall:

i) Notify the Executive Secretary of the out of compliance status within 24 hours of detection followed by a written notice within 5 days of the detection.

ii) Initiate monthly sampling unless the Executive Secretary determines that other periodic sampling is appropriate until the facility is brought into compliance.

iii) Submit a Source Assessment and Compliance Schedule to the Executive Secretary within 30 days of detection of the out of compliance status that outlines the following:

- Steps of action that will assess the source, extent, and potential dispersion of the contamination.
- Evaluation of potential remedial actions to restore and maintain ground water quality and ensure the permit limits will not be exceeded at that compliance monitoring point.
- Measures to ensure best available technology will be re-established.

iv) Implement the Source Assessment and Compliance Schedule as directed by the Executive Secretary.

I. Non- Compliance for Best Available Technology

Kennecott is required to maintain the Best Available Technology in accordance with the approved design and practice for this permit. Failure to maintain BAT or maintain the approved design and practice shall be a violation of this permit. In the event a compliance action is initiated against the permittee for violation of permit conditions relating to best available technology, Kennecott may affirmatively defend against that action by demonstrating the following:

a. Kennecott submitted notification in accordance with R317-6-6.13;

b. The failure was not intentional or caused by Kennecott's negligence, either in action or in failure to act;

c. Kennecott has taken adequate measures to meet permit conditions in a timely manner or has submitted for the Executive Secretary's approval, an adequate plan and schedule for meeting permit conditions; and

d. The provisions of UCA 19-5-107 have not been violated.

J. Reporting Requirements

1. Reporting

a. *Monitoring Wells* - Water quality sampling results for monitoring wells, (except for radionuclide analyses), shall be submitted quarterly to the Executive Secretary as follows:

Quarter Sampled In		Report Due On
1st	(Jan., Feb., March)	May 15
2nd	(April, May, June)	August 15
3rd	(July, Aug., Sept.)	November 15
4th	(Oct., Nov., Dec.)	February 15

Radionuclide analyses shall be submitted annually by March 31 of each year.

b. *Operational Monitoring* - Operational monitoring results including interstitial waters, decant pond flows, tailings inflows, acidification analysis, and radionuclide results shall be submitted in an annual report by March 31 of each year.

Failure to submit reports within the timeframe due shall be deemed as noncompliance and may result in enforcement action.

K. Compliance Schedule

1. *Additional Compliance Monitoring Wells* - Kennecott shall install, develop and begin sampling the new and replacement monitoring wells approved in the Division's letter of November 20, 1995, within 180 days of permit issuance.

2. *Documentation of New and Replacement Well Installations* - Within 60 days of completion of the new and replacement monitoring wells required by item 1 of this compliance schedule, Kennecott shall submit documentation on the wells demonstrating that each well is in conformance with the EPA RCRA Ground Water Monitoring Technical Enforcement Guidance Document, 1986, OSWER-9950.1 (RCRA TEGD) Section 3.5.

3. *Corrective Action* - Within 180 days of notification by the Executive Secretary that corrective action is not proceeding in a timely fashion, Kennecott shall submit for approval a Contamination Investigation and Corrective Action Plan to clean up contamination problems associated with the Tailings Impoundment. The Contamination Investigation and Corrective Action Plan shall be compiled in accordance with R317-6-6.15

4. *Assessment of Acidification Potential* - Kennecott shall submit to the Executive Secretary within 180 days of the date of issuance of this permit, a program for ongoing assessment and characterization of the acidification potential of the tailings material. This program shall include number of samples and locations, along with protocols for: sampling, handling of samples, analytical methods to be used, and QA\QC measures. The program will assure a representative characterization of both the coarse and fine fractions of the new tailings area as well as the existing impoundment is achieved. The plan shall commit to submitting an annual report to the Executive Secretary by March 31 for the prior years sampling and analysis and a compilation of results every five years, 180

days prior to permit renewal. The annual reports will provide the methods, assumptions, analytical approaches and quality assurance\quality control results and copies of the laboratory analytical results for all samples taken if not previously provided. Upon approval by the Executive Secretary, this plan will be incorporated into this permit as Appendix A.

5. *Backfill of Bonneville Clay Incised Areas* - Selected areas underlying the expansion portion of the Tailings Impoundment have been incised by surface drainages that have cut through the Bonneville Clay layer. Kennecott must submit no later than 90 days following permit issuance a plan that details how these areas will be backfilled with low permeability clay materials so that a continuous competent clay liner is present beneath the tails materials.

6. *Operational Monitoring Plan* - Kennecott shall submit for approval by the Executive Secretary, within 90 days of permit issuance an operational monitoring plan to sample water quality of the interstitial waters, water decanted from the top of the impoundment & other outflows such as seeps, and characterization of inflows into the Tailings Impoundment. Characterization of inflows shall include ongoing analysis for acid generation potential. The plan shall address the monitoring requirements of Part I Section G of this permit. Upon approval by the Executive Secretary this plan will be incorporated into this permit as Appendix B.

7. *Permit Renewal Application Items* - As a part of the application for permit renewal each five years, Kennecott will include water level data and a potentiometric surface map for both the shallow and principal aquifer systems within at least a one mile perimeter of the impoundment. The water level data and maps will delineate changes in water levels that have occurred over the life of the permit. In addition Kennecott will provide a water quality summary of the data collected to date for the shallow and principal aquifers as well as data from the operational monitoring plan with an analysis of changes and trends in the data over the life of the permit.

8. *Blanket Drain Construction Plans & Specifications,* - Kennecott shall submit plans and specifications for the construction of the blanket drain to be placed in the base of the embankment of the expansion portion of the Tailings Impoundment that have been approved by the State Engineer. These plans shall be submitted within 90 days of permit issuance.

9. *Closure Plan* - Kennecott shall submit within 1 year of permit issuance for approval by the Executive Secretary, a final closure plan for the existing and expansion portions of the Tailings Impoundment. The plan will provide detail on all aspects of closure that are related to or have an impact on water quality. For any issues that require further study prior to finalizing aspects to the closure plan, details on what each study will include, and a schedule with milestones for each segment of the study shall be included in Kennecott's plan.

10. Within 90 days of permit approval Kennecott shall update the Ground Water Characterization and Monitoring Plan (GCMP) to include Standard Operating Procedures for ground water sampling of radionuclides to include Uranium, Radium 226 and Radium 228. The analytical method to be utilized and method detection limit shall also be included.

II. MONITORING, RECORDING AND REPORTING REQUIREMENTS

A. Representative Sampling. Samples taken in compliance with the monitoring requirements established under Part I shall be representative of the monitored activity.

B. Analytical Procedures. Water sample analysis must be conducted according to test procedures specified under UAC R317-6-6.3L, unless other test procedures have been specified in this permit.

C. Penalties for Tampering. The Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

D. Reporting of Monitoring Results. Monitoring results obtained for each monitoring period specified in the permit, shall be submitted to the Executive Secretary, Utah Division of Water Quality at the following address no later than 45 days after the end of the monitoring period:

State of Utah
Division of Water Quality
Department of Environmental Quality
Salt Lake City, Utah 84114-4870
Attention: Ground Water Quality Program

E. Compliance Schedules. Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any Compliance Schedule of this permit shall be submitted no later than 14 days following each schedule date.

F. Additional Monitoring by the Permittee. If the permittee monitors any pollutant more frequently than required by this permit, using approved test procedures as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted. Such increased frequency shall also be indicated.

G. Records Contents. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements:
2. The individual(s) who performed the sampling or measurements;
3. The date(s) and time(s) analyses were performed;

4. The individual(s) who performed the analyses;
5. The analytical techniques or methods used; and,
6. The results of such analyses.

H. Retention of Records. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the Executive Secretary at any time.

I. Twenty-four Hour Notice of Noncompliance and Spill Reporting.

1. The permittee shall verbally report any noncompliance, or spills subject to the provisions of UCA 19-5-114, which may endanger public health or the environment as soon as possible, but no later than twenty-four (24) hours from the time the permittee first became aware of the circumstances. The report shall be made to the Utah Department of Environmental Quality 24 hour number, (801) 536-4123, or to the Division of Water Quality, Ground Water Protection Section at (801) 538-6146, during normal business hours (8:00 am - 5:00 pm Mountain Time).

2. A written submission shall also be provided to the Executive Secretary within five days of the time that the permittee becomes aware of the circumstances. The written submission shall contain:

   a. A description of the noncompliance and its cause;

   b. The period of noncompliance, including exact dates and times;

   c. The estimated time noncompliance is expected to continue if it has not been corrected; and,

   d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

3. Reports shall be submitted to the addresses in Part II D, Reporting of Monitoring Results.

J. Other Noncompliance Reporting. Instances of noncompliance not required to be reported within 24 hours, shall be reported at the time that monitoring reports for Part II D are submitted.

K. Inspection and Entry. The permittee shall allow the Executive Secretary, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and,

4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

III. COMPLIANCE RESPONSIBILITIES

A. Duty to Comply. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and re-issuance, or modification; or for denial of a permit renewal application. The permittee shall give advance notice to the Executive Secretary of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

B. Penalties for Violations of Permit Conditions. The Act provides that any person who violates a permit condition implementing provisions of the Act is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions is subject to a fine not exceeding $25,000 per day of violation. Any person convicted under Section 19-5-115(2) of the Act a second time shall be punished by a fine not exceeding $50,000 per day. Nothing in this permit shall be construed to relieve the permittee of the civil or criminal penalties for noncompliance.

C. Need to Halt or Reduce Activity not a Defense. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to Mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

IV. GENERAL REQUIREMENTS

A. Planned Changes. The permittee shall give notice to the Executive Secretary as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required when the alteration or addition could significantly change the nature of the facility or increase the quantity of pollutants discharged.

B. Anticipated Noncompliance. The permittee shall give advance notice of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

C. Permit Actions. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and re-issuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

D. Duty to Reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a permit renewal or extension. The application should be submitted at least 180 days before the expiration date of this permit.

E. Duty to Provide Information. The permittee shall furnish to the Executive Secretary, within a reasonable time, any information which the Executive Secretary may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Executive Secretary, upon request, copies of records required to be kept by this permit.

F. Other Information. When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Executive Secretary, it shall promptly submit such facts or information.

G. Signatory Requirements. All applications, reports or information submitted to the Executive Secretary shall be signed and certified.

1. All permit applications shall be signed as follows:

   a. For a corporation: by a responsible corporate officer;
   b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively.

c. For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

2. All reports required by the permit and other information requested by the Executive Secretary shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described above and submitted to the Executive Secretary, and,

b. The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

3. Changes to Authorization. If an authorization under Part IV G 2. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part IV G 2. must be submitted to the Executive Secretary prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

H. Penalties for Falsification of Reports. The Act provides that any person who knowingly makes any false statement, representation, or certification in any

record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

I. Availability of Reports. Except for data determined to be confidential by the permittee, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Executive Secretary. As required by the Act, permit applications, permits, effluent data, and ground water quality data shall not be considered confidential.

J. Property Rights. The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

K. Severability. The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

L. Transfers. This permit may be automatically transferred to a new permittee if:

1. The current permittee notifies the Executive Secretary at least 30 days in advance of the proposed transfer date;
2. The notice includes a written agreement between the existing and new permittee containing a specific date for transfer of permit responsibility, coverage, and liability between them; and,
3. The Executive Secretary does not notify the existing permittee and the proposed new permittee of his or her intent to modify, or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph 2 above.

M. State Laws. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, penalties established pursuant to any applicable state law or regulation under authority preserved by Section 19-5-117 of the Act.

N. Reopener Provision. This permit may be reopened and modified (following proper administrative procedures) to include the appropriate limitations and compliance schedule, if necessary, if one or more of the following events occurs:

1. If new ground water standards are adopted by the Board, the permit may be reopened and modified to extend the terms of the permit or to include pollutants covered by new standards. The permittee may apply for a variance under the conditions outlined in R317-6-6.4(D)

2. If alternate compliance mechanisms are required

3. If water quality of the facility is significantly worse than represented in the original permit application.

4. Following receipt of 12 months of sampling data to incorporate protection levels for new compliance monitoring wells required in Part I Section L.

5. If results from operational monitoring indicate acidification of the Tailings is occurring or is likely to occur in the future or chemical makeup of the waste streams has changed significantly enough to effect a change in impacts to ground water.

P:Kenncott/TAILINGS.PER

TABLE 1 -Compliance Monitoring Well Background and Protection Levels

			Monitoring Well NET449D (class II)				Monitoring Well NET500A (class III)				Monitoring Well NET500B (class II)				Monitoring Well NET504A (class III)			
			Background		Protection	Compliance Limit Mean+2σ	Background		Protection	Compliance Limit Mean+2σ	Background		Protection	Compliance Limit Mean+2σ	Background		Protection	Compliance Limit Mean+2σ
Parameter	method detection limit	ground water quality standard	Level(mg/L)		Level (mg/L)	(mg/L)	Level(mg/L)		Level (mg/L)	(mg/L)	Level(mg/L)		Level (mg/l)	(mg/l)	Level(mg/l)		Level (mg/l)	(mg/L)
			mean	stdev			mean	stdev			mean	stdev			mean	stdev		
pH (units)	n/a	6.5-8.5	7.96	n/a	6.5-8.5		7.06	n/a	6.5-8.5		8.36	n/a	6.5-8.5		7.93	n/a	6.5-8.5	
Arsenic	.01	0.05	0.03	0.015	.038	.060	.048	.046	.05[e]	.14	.007	.003	.013[b]	.013	.141	.178	.141[d]	.497
Barium	.01	2.0	.043	.019	.5	.082	.034	.009	1.0	.052	.072	.032	.5[b]	.136	.117	.037	1.0[b]	.192[b]
Cadmium	.002	0.005	nd	n/a	.002[c]	n/a	nd	n/a	.003[b]	n/a	nd	n/a	.002[c]	n/a	nd	n/a	.002[c]	n/a
Chromium	.01	0.1	.002	.002	.025[b]	.007	.007	.006	.05[b]	.019	.008	.009	.025[b]	.025	.004	.006	.006	.017
Copper	.01	1.3	.005	0.004	.325[b]	.012	.02	.01	.65[b]	.039	.013	.014	.325[b]	.04	.037	.047	.65[b]	.131
Selenium	.0002	0.05	nd	n/a	.013[b]	n/a	.008	.007	.025[b]	.021	nd	n/a	.013[b]	n/a	nd	n/a	.025[b]	n/a
Zinc	.01	5.0	.016	.015	1.25[b]	.045	.03	.017	2.5[b]	.064	.025[f]	.034	1.25[b]	.044	.017	.012	2.5[b]	.041
Fluoride	.1	4.0	.875	.096	1.09	1.066	1.920	.228	2.88	2.38	1.84	.71	2.30	3.27	1.34	.18	2.0	1.7
TDS	5.0	3000	820	121	1025	1061	5409	580	6761	6568	1314	67	1643	1448	5423	140	6779	5703

			Monitoring Well NET504B (classIII)				Monitoring Well NET529B (classIII)				Monitoring Well NET529C (classIII)				Monitoring Well NET531B (class III)			
	MDL	G.W.Q. std.	mean	stdev	P.L.	Compliance Limit Mean+2σ	mean	stdev	P.L.	Compliance Limit Mean+2σ	mean	stdev	P.L.	Compliance Limit Mean+2σ	mean	stdev	P.L.	Compliance Limit Mean+2σ
pH (units)	n/a	6.5-8.5	7.7	n/a	6.5-8.5		8.23	n/a	6.5-8.5		8.51	n/a	6.5-8.5		8.00	n/a	6.5-8.5	
Arsenic	.01	0.05	0.174	0.057	.174[d]	.288	.246	.114	.246[d]	.474	.32	.146	.32[d]	.613	.246	.037	.246[d]	.320
Barium	.01	2.0	.067	.035	1.0	.136	.063	.041	1.0[b]	.146	.053	.023	1[b]	.099	.091	.059	1.0[b]	.209
Cadmium	.002	0.005	nd	n/a	.003[b]	n/a	nd	n/a	.003[b]	n/a	nd	n/a	.003[b]	n/a	.002	.002	.003[b]	.007
Chromium	.01	0.1	.004	.005	.05[b]	.015	.007	.010	.05[b]	.026	.010	.015	.05[b]	.039	.003	.003	.05[b]	.01
Copper	.01	1.3	.0583	0.0723	.65[b]	.203	.036	.046	.65[b]	.128	.017	.020	.65[b]	.058	.017	.017	.65[b]	.05
Selenium	.0002	0.05	nd	n/a	.025[b]	n/a	nd	na	.025[b]	n/a	nd	n/a	.025[b]	n/a	.002	.001	.025[b]	.005
Zinc	.01	5.0	.020	.010	2.5[b]	.041	.023	.016	2.5[b]	.055	.024	.011	2.5[b]	.046	.029	.017	2.5[b]	.064
Fluoride	.1	4.0	0.86	0.13	2.0[b]	1.123	3.03	.229	4.0[e]	3.5	3.12	.16	4.0[e]	3.437	1.305	.479	2.0	2.262
TDS	5.0	3000	9531	322	10000	10175	1864	132	2330	2128	1312	54	1640	1420	1388	196	1735	1781

Table 1 - Continued - Compliance Monitoring Well Background and Protection Levels

Parameter	method detection limit	ground water quality standard	Monitoring Well NET532A (class III)				Monitoring Well NET532B (class III)				Monitoring Well NET536A (class II)				Monitoring Well NET536B (class II)			
			Background Level(mg/L)		Protection Level (mg/L)	Compliance Limit Mean+2σ (mg/L)	Background Level(mg/L)		Protection Level (mg/L)	Compliance Limit Mean+2σ (mg/L)	Background Level(mg/L)		Protection Level (mg/l)	Compliance Limit Mean+2σ (mg/l)	Background Level(mg/l)		Protection Level (mg/l)	Compliance Limit Mean+2σ (mg/L)
			mean	stdev			mean	stdev			mean	stdev			mean	stdev		
pH (units)	n/a	6.5-8.5	7.89	n/a	6.5-8.5		7.43	n/a	6.5-8.5		7.35	n/a	6.5-8.5		7.75	n/a	6.5-8.5	
Arsenic	.01	0.05	0.177	0.05	.177[d]	.276	.181	.016	.181[d]	.213	.038	.017	.048	.072	.021	.008	.027	.037
Barium	.01	2.0	.074	.018	1.0	.110	.769	.278	1.154	1.324	.213	.047	0.5[b]	.306	.070	.017	0.5[b]	0.105
Cadmium	.002	0.005	nd	n/a	.003[b]	n/a	.001	.001	.003[b]	.002	nd	n/a	.002[c]	n/a	nd	n/a	.002[c]	n/a
Chromium	.01	0.1	.005	.005	.05[b]	.015	.004	.004	.05[b]	.011	nd	n/a	.025[b]	n/a	nd	n/a	.025[b]	n/a
Copper	.01	1.3	.03	0.019	.65[b]	.068	.017	.010	.65[b]	.037	.010	.009	.325[b]	.029	.007	.007	.325[b]	.02
Selenium	.0002	0.05	nd	n/a	.025[b]	n/a	.003	.003	.025[b]	.009	.006	.005	.013[b]	.015	nd	n/a	.013[b]	n/a
Zinc	.01	5.0	.024	.009	2.5[b]	.042	.029	.019	2.5[b]	.068	.027	.011	1.25[b]	0.05	.031	.006	1.25[b]	.043
Fluoride	.1	4.0	1.15	.136	2.0[b]	1.431	.749	.303	2.0[b]	1.356	.472	.096	1.0[b]	.665	.550	.107	1.0[b]	.764
TDS	5.0	3000	6290	258	7863	6806	4409	389	5511	5187	2231	253	2788	2736	710	26	888	763

	MDL	G.W.Q. std.	Monitoring Well NET536C (classII)				Monitoring Well NET643B (class III)				Monitoring Well NET644A (class IV)				Monitoring Well NET644B (class IV)			
			mean	stdev	P.L.	Compliance Limit Mean+2σ	mean	stdev	P.L.	Compliance Limit Mean +2σ	mean	stdev	P.L.	Compliance Limit Mean+2σ	mean	stdev	P.L.	Compliance Limit Mean+2σ
pH (units)	n/a	6.5-8.5	7.72	n/a	6.5-8.5		7.87	n/a	6.5-8.5		6.92	n/a	6.5-8.5		7.52	n/a	6.5-8.5	
Arsenic	.01	0.05	0.009	0.004	.013[b]	.017	.158	.033	.158[d]	.223	.071	.059	.189[f]	.189	.227	.105	.437[f]	.437
Barium	.01	2.0	.066	.032	0.5[b]	0.131	.052	.012	1.0[b]	.076	.024	.039	2.0[f]	.102	.029	.029	2.0[f]	.088
Cadmium	.002	0.005	nd	n/a	.002[c]	n/a	nd	n/a	.003[b]	n/a	nd	n/a	.005[f]	n/a	nd	n/a	.005[f]	n/a
Chromium	.01	0.1	.007	.004	.025[b]	.015	.005	.004	.05[b]	.013	.034	.067	.1[f]	.168	.032	.066	.1[f]	.165
Copper	.01	1.3	nd	n/a	.325[b]	n/a	.082	.127	.65[b]	.336	.316	.297	1.3[f]	.91	.138	.102	1.3[f]	.341
Selenium	.0002	0.05	nd	n/a	.013[b]	n/a	nd	na	.025[b]	n/a	nd	n/a	.05[f]	.025	nd	n/a	.05[f]	n/a
Zinc	.01	5.0	.051	.031	1.25[b]	.112	.023	.011	2.5[b]	.044	.022	.018	5.0[f]	.059	.021	.018	5.0[f]	.057
Fluoride	.1	4.0	0.467	0.082	1.0[b]	.630	1.79	.136	2.68	2.059	.844	.835	4.0[f]	2.5	1.211	.468	4.0[f]	2.146
TDS	5.0	3000	788	60	985	908	6704	117	8380	6938	188892	23481	none	none	27200	939	none	none

Table 1 - Continued - Compliance Monitoring Well Background and Protection Levels

Parameter	method detection limit	ground water quality standard	Monitoring Well NET646A (class IV)				Monitoring Well NET646B (class IV)				Monitoring Well NET640A (class IV)				Monitoring Well NET640B (class IV)			
			Background Level(mg/L)		Protection Level (mg/L)	Compliance Limit Mean+2σ (mg/L)	Background Level(mg/L)		Protection Level (mg/L)	Compliance Limit Mean+2σ (mg/L)	Background Level(mg/L)		Protection Level (mg/l)	Compliance Limit Mean+2σ (mg/l)	Background Level(mg/l)		Protection Level (mg/l)	Compliance Limit Mean+2σ (mg/L)
			mean	stdev			mean	stdev			mean	stdev			mean	stdev		
pH (units)	n/a	6.5-8.5	6.95	n/a	6.5-8.5		7.23	n/a	6.5-8.5		7.41	n/a	6.5-8.5		7.59	n/a	6.5-8.5	
Arsenic	.01	0.05	0.063	0.080	.224[f]	.224	.122	.095	.312[f]	.312	.012	.009	.05	.031	0.13	0.08	0.287	0.287
Barium	.01	2.0	.081	.132	2.0[f]	.345	.078	.063	2.0[f]	.204	1.45	0.5	2.451	2.451	.142	.062	2.0	0.267
Cadmium	.002	0.005	nd	n/a	.005[f]	n/a	nd	n/a	.005[f]	n/a	nd	n/a	.005	.005	nd	n/a	.005	.005
Chromium	.01	0.1	.024	.046	.1[f]	.117	.012	.017	.1[f]	.096	.013	.011	0.1	.034	.007	.006	0.1	0.019
Copper	.01	1.3	.222	0.189	1.3[f]	.60	.205	.256	1.3[f]	.718	.116	.149	1.3	.413	.072	.108	1.3	.289
Selenium	.0002	0.05	nd	n/a	.05[f]	n/a	nd	n/a	.05[f]	n/a	nd	n/a	0.05	.05	nd	n/a	.05	.05
Zinc	.01	5.0	.015	.003	5.0[f]	.02	.015	.013	5.0[f]	.02	.017	.009	5	5	.023	.011	5	5
Fluoride	.1	4.0	.80	.51	4.0[f]	1.820	.513	.064	4.0[f]	.641	0.67	0.74	4	2.15	1.09	.45	4	1.98
TDS	5.0	3000	115475	3558	none	none	44282	1433	none	none	19783	368	none	none	10367	148	none	none

	MDL	G.W.Q. std.	Monitoring Well 604A (class (II))				Monitoring Well 604B (class II)				Monitoring Well				Monitoring Well			
			mean	stdev	P.L.	Compliance Limit Mean+2σ	mean	stdev	P.L.	Compliance Limit Mean+2σ	mean	stdev	P.L.	Compliance Limit Mean+2σ	mean	stdev	P.L.	Compliance Limit Mean+2σ
pH (units)	n/a	6.5-8.5	7.34	n/a	6.5-8.5		7.76	.315	6.5-8.5									
Arsenic	.01	0.05	.069	.057	.086	.183	0.035	.055	.044	.146								
Barium	.01	2.0	.029	.023	0.5	.074	.12	.19	.50	.499								
Cadmium	.002	0.005	.004	.007	.005	.018	.002	.004	.003	.010								
Chromium	.01	0.1	.005	.005	.025	.016	.007	.006	.025	.018								
Copper	.01	1.3	.011	.005	.325	.021	.024	.045	.325	.113								
Selenium	.0002	0.05	.004	.002	.013	.008	.004	.002	.013	.008								
Zinc	.01	5.0	.019	.014	1.25	.047	.027	.019	1.250	.066								
Fluoride	.1	4.0	1.229	.076	1.536	1.380	.70	0.0	1.0	0.7								
TDS	5.0	3000	2555	579	3193	3712	1251	48	1564	1346								

Table 1 - Continued - Compliance Monitoring Well Background and Protection Levels

b-Protection Level established based on 0.X times the Ground Water Quality Standard.

c-Protection Level established at the reported method minimum detection limit.

d-Background value exceeds ground water quality standard; Protection Level = background (no net increase approach).

e-1.x times background exceeds ground water quality standard; Protection Level = ground water quality standard

f-Compliance Level for Class IV well will be ground water quality standard or mean plus two standard deviations

GROUND WATER QUALITY DISCHARGE PERMIT

STATEMENT OF BASIS

Kennecott Tailings Impoundment

Description of Facility and Background Information

Existing Impoundment - The Tailings Impoundment that currently resides north and slightly west of the town of Magna has been utilized since about 1906. This impoundment which has been utilized for the disposal of tailings from processing of ore from the Bingham Canyon area, has undergone numerous changes and expansions to accommodate an ever increasing volume of materials. Present estimates of the volume currently contained in the impoundment are about 1.5 billion tons of tailings. The area occupied by the impoundment is presently estimated at 5,700 acres with embankment heights approaching 200 feet. The existing impoundment includes an area referred to as the "Diving Board" area located just south of State Road 201 at about 9180 West. This area is utilized for retention of tailings from the North (Magna) Concentrator under upset conditions when flow is stopped to the main impoundment. Tailings already in the discharge line flow to the Diving Board Area when a shut down of the line occurs. Tailings placed in the Diving Board Area are periodically excavated and transferred to the main Tailings Impoundment

Proposed Expansion - The capacity of the existing impoundment is nearing its operational life. Kennecott is proposing to add approximately 3,300 acres adjacent to and north of the existing impoundment to enable operations of the Bingham Canyon Mine to go on for approximately another 20 to 30 years. The old Morton Salt operations (to the north of the existing impoundment) and the old Chevron fertilizer plant (to the northwest of the existing impoundment) have been or are being demolished and the land covered by the proposed impoundment expansion.

Site Hydrogeology

Three aquifer systems exist in the vicinity of the Tailings Impoundment. The Bedrock Aquifer system associated with the Oquirrh Mountains, the confined Principal Aquifer and the unconfined Shallow Aquifer comprise the ground water system in the vicinity of the Tailings Impoundment.

The bedrock aquifer system associated with the Oquirrh Mountains is comprised of highly fractured Paleozoic carbonate rocks. Recharge to this system is principally from precipitation on the mountains to the south. The flowpath through this aquifer moves from the bedrock system into the Principal and Shallow Aquifers or is discharged as spring water along bedrock

contacts at the base of the mountains. Water quality of the bedrock aquifer system is generally good with TDS values typically less than 2000 mg/l. There are occasional arsenic and several selenium values that exceed ground water quality standards in the bedrock aquifer. The high selenium values are most likely attributable to localized impacts from the Refinery operations in the past.

The Principal Aquifer is a confined system which includes a gravel zone and lacustrine deposits. The gravel zone was most likely derived from the mountains during an extensive low lake cycle. Many high yield water supply wells near the Oquirrh Mountains are completed in the gravel zone of the Principal Aquifer. The lacustrine zone consists of clay, silt and interbedded fine sand. Principal ground water flow direction for this aquifer is north to northwest. Except directly beneath the existing Tailings Impoundment, measured water levels in the principal aquifer are above ground level at locations north of Highway 201 indicating an upward gradient throughout the vicinity of the existing Tailings Impoundment. A ground water mound exists directly beneath the existing Tailings Impoundment with downward vertical gradients existing, although these have not been well documented at this time. Water quality in this aquifer is generally better than the Shallow Aquifer with TDS values ranging from 700 to 40,000 mg/l. The higher TDS values correlate with proximity to the Great Salt Lake. Metals values for arsenic, selenium, and cadmium in excess of state Ground Water Quality Standards have been observed in the principal aquifer.

The Shallow Aquifer system consists of interbedded lacustrine Bonneville clay, silt, and fine sand. The exact depth of this system varies but is approximately the upper 35 to 50 feet of saturated sediments. The potentiometric surface for the Shallow Aquifer system depicts lateral flow in a northwesterly direction with vertical ground water flow gradients predominantly in an upward direction for the majority of wells completed in the shallow system. A ground water mound exists directly beneath the Tailings Impoundment with downward vertical gradients indicating a potential for discharge of Tailings into the shallow system. Water quality in this system varies markedly from the contact with the bedrock system on the south showing good quality waters with TDS values around 1000 mg/l to TDS values exceeding 200,000 mg/l in the vicinity of the Great Salt Lake. Arsenic, selenium, and cadmium values have been observed in the shallow aquifer that exceed state Ground Water Quality Standards.

Description of Facility Operations

Existing Impoundment - Tailings are deposited into the existing impoundment via a peripheral discharge system that can distribute tails around the pond circumference as well as through two main discharge lines that flow directly into the impoundment. Water is removed from the top of the impoundment via siphon tubes that route water into a clarification canal that normally provides water for Kennecott's operations at the Copperton & North

Concentrators. When necessary, the water in the clarification canal can be discharged to the C-7 ditch through a UPDES permitted discharge point. Seepage from the impoundment is collected in part via ditches that have been constructed around the perimeter of the impoundment. Some seepage from the impoundment enters the shallow aquifer system. Kennecott estimates this amount at 620 gallons per minute. The existing impoundment will operate for only 8 to 10 more years as the proposed impoundment expansion is being constructed.

Proposed Expansion - The proposed expansion area will be operated in similar fashion to the existing impoundment in terms of discharges. Kennecott has evaluated several options for liner technology for the proposed expansion area of the tailings impoundment. After considering the possible options, use of a natural liner system is proposed for this area. The expansion area is underlain by the Bonneville clay layer, a lacustrine deposit with good lateral extent and thickness. Measured vertical hydraulic conductivities in the 4×10^{-8} cm/sec range are given for the Bonneville clay. In addition to minimizing vertical migration of tails water, Kennecott is proposing installation and use of a three foot thick blanket drain layer in the base of the embankment to promote horizontal seepage of water through the embankment and into a toe drain collection ditch.

Construction of the impoundment embankment will proceed in advance of tailings deposition with the ultimate height of the embankment being reached in 20 to 30 years. Closure of the expansion portion of the tailing impoundment will be carried out in similar fashion to the existing portion of the impoundment.

Bevill Excluded Wastes - Congress granted an exclusion from the requirements of the hazardous waste program for certain mining wastes. This exclusion, known as the Bevill Amendment, identifies solid wastes from the extraction, beneficiation, and processing of ores and minerals and excludes them from the requirements of the EPA Hazardous Waste Program. The basis of this exclusion was that these wastes are characterized by high volume, low hazard, and that management as hazardous waste may be inappropriate. On June 23, 1990 EPA issued a final rule that listed 20 mineral processing wastes that are excluded. Four of the six inflows to the Tailings Impoundment are included under this Bevill exclusion and therefore are not subject to the requirements of the Hazardous Waste Program.

Waste Stream Inflows - Waste stream inflows authorized under this permit for placement in the Tailings Impoundment are:

1) Copper Tailings from the Copperton Concentrator
2) Copper Tailings from the North Concentrator
3) Slag Tailings from the slag concentrator at the Smelter
4) Power Plant ash slurry

5) Construction, maintenance and lunchroom trash
6) Wastewater effluent slurry from the Hydrometalurgical Plant at the Smelter
7) Other flows that are approved by the Executive Secretary for this permit

The first four waste streams listed are included under the regulatory exclusion from RCRA as Bevill waste. Waste streams from items 5 and 6 do not meet the criteria for hazardous waste. Over 99% of the volume of materials placed in the impoundment are copper tailings.

Corrective Action Clean Up

The Ground Water Quality Protection Regulations require applicants to submit a corrective action plan or other response measures to be taken to remedy any violation of ground water quality standards resulting from discharges occurring prior to issuance of a ground water discharge permit. At the time of permit issuance, no corrective action is envisioned. However, if clean up is needed, the permit has a compliance condition that allows the Executive Secretary to call for a Contamination Investigation and Corrective action plan to be submitted and made a part of this permit should future data indicate that clean up of existing contamination at the Tailings Impoundment site is in fact needed.

Background Water Quality

Assessing background water quality is a complicated exercise for the area around the Tailings Impoundment. Several complicating factors impede measurement or estimation of true background. There are two previously existing facilities that may have impacted ground water quality. The Morton Salt operation directly to the north and the Chevron Phosphate operation to the northwest of the existing impoundment represent over 80% of the new impoundment expansion area. Impacts from these operations have likely complicated the ability to observe any tailings impacts. In addition, given the copper tailing's nearly century long history of operations, impacts, if any, from the tailings impoundment have probably already occurred.

In light of the aforementioned complicating factors, Ground Water Protection Levels for this permit are established using existing water quality on a well by well basis. This approach ensures that the existing water quality will be protected and not allowed significant degradation from existing levels. There are several compliance monitoring wells that are relatively close to the bedrock contact and that reflect class II water quality. These wells are assigned protection levels consistent with class II waters. The majority of the compliance monitoring wells are placed in class III ground water. These wells are assigned protection levels consistent with class III ground water. Additionally, the method given in R317-6-4.6 A 3 which allows for a no net increase standard for class III waters when the background concentration already exceeds the ground water quality standard is used where indicated.

Compliance wells completed in class IV ground water are assigned protection levels equal to the ground water quality standards (same as drinking water MCL's) or the background value plus two standard deviations (whichever is higher) with the exception that TDS limits are not imposed for class IV waters. Due to influences of the Great Salt Lake, TDS values in the class IV wells range from 18,000 to over 100,000 mg/l. The basis for assigning protection levels (except TDS) to class IV waters that are in close proximity to the Great Salt Lake is to protect wetlands systems that exist in proximity to the lake and serve as habitat for shore birds and other aquatic species.

In several instances in class III wells, the background value for arsenic exceeds the ground water quality standard of 0.05 mg/l. In these instances a protection level equal to the background value has been set as the protection level for this situation as indicated by R317-6-4.6 (no net increase). However, because sample results from these wells will routinely exceed the background value due to normal variation around the mean, probable out of compliance is defined as when concentrations exceed the background value plus two standard deviations (referred to as the compliance limit in Table 1).

Basis for Permit Issuance

Kennecott conducted Toxic Characteristic Leaching Procedure (TCLP) and Synthetic Precipitation Leaching Procedure (SPLP) analysis of tailings material to describe the toxicity of the tailings even though this material is not subject to RCRA requirements. Samples from three separate borings at various depths were analyzed. Both TCLP and SPLP analysis did not reveal any toxicity concerns. In fact all values from these tests were below the detection limit except for Barium. Barium values from the TCLP analysis ranged from 0.2 to 0.4 mg/l. The TCLP maximum limit for Barium is 100 mg/l. Further, the interstitial waters in the tailings have been characterized and do not appear problematic. To assure that the waste streams going into the Tailings Impoundment do not contain materials that differ markedly from those waste streams that have been characterized, the permit requires only materials of Bingham Pit origin and related processing wastes be disposed of in the Tailings Impoundment. There is a provision for Kennecott to request a variance from this standard for incidental situations that would not impact overall water quality of the impoundment.

Kennecott has proposed a discharge minimization approach with a monitoring component to assess if any impacts occur. Discharge minimization will be achieved through use of a natural clay liner beneath the impoundment to impede downward flow of tailings waters. The proposed liner consists of the upper portion of the Bonneville Clay which is generally 9 feet thick and is continuous throughout the expansion area with the exception of a few selected areas that have been incised by surface drainages (these areas will be backfilled pursuant to a compliance condition in the permit). Vertical hydraulic conductivities for this segment of the Bonneville Clay have been measured ranging from 3×10^{-7} cm/sec to 4×10^{-8} cm/sec. The

proposed liner technology appears to meet the requirements of R317-6-6.4 A3 and C3. Best Available Technology is defined in R317-6-1.3 as"... the application of design, equipment, work practice, operation standard or combination thereof at a facility to effect the maximum reduction of a pollutant achievable by available processes and methods taking into account energy, public health, environmental and economic impacts and other costs."

Given the liner alternatives that exist and the logistical as well as economic challenges of installation of a liner system in the proposed expansion portion, an area of approximately 3,300 acres, the best alternative is utilization of the Bonneville Clay layer as the liner to minimize seepage out of the impoundment. Other alternatives that were considered do not appear to achieve any significant increase in performance over use of the Bonneville Clay layer especially in light of the economic costs of these alternatives as well as the life expectancy of man made liner materials.

The compliance well monitoring network will be comprised of 29 wells in 15 locations. Most well locations contain two wells; one in the upper shallow unconfined aquifer and one completed in the lower confined aquifer. Twenty two of these wells are currently in place however 11 of these will be replaced due to construction of the new embankment for the Tailings expansion. The perimeter of the existing and proposed expansion areas is approximately 14 miles in length. The 15 locations comprise a well frequency of about one well location per mile of embankment.

Potential Impacts to Water Quality

It is likely that over time with the height of the proposed expansion portion of the impoundment reaching over 200 feet, that downward gradients will develop and allow some movement of tailings water through the Bonneville Clay and into the aquifer systems below. The average concentrations of contaminants in the interstitial waters of the Tailings, when compared to the concentrations in the shallow and principal aquifers, are summarized in Table A of this Statement of Basis.

While the numbers in Table A are average values and some individual values may differ significantly, it is anticipated that the overall water quality of the shallow and principal aquifers will not be degraded by water from the impoundment. The quality of interstitial waters from the impoundment will continue to be sampled twice annually throughout the term of this permit to provide a check on quality of these waters.

One of the most important technical issues associated with the Tailings Impoundment is the long term potential for acidification of the tailings material. The chemical reactions associated with oxidation of pyritic sulfur results in production of acid, which if not neutralized could, over time, acidify the tailings materials. Should this happen, leaching of

metals and other constituents that are not mobile in neutral pH conditions can occur. Kennecott has conducted static and kinetic testing of tailings materials to predict the potential for the tailings to acidify over time. Preliminary results indicate that the potential for the tailings pile to go acidic are low. However, to assure that signs of acidification are not showing up through the life of the impoundment, Kennecott is required to monitor the interstitial water within the tailings and to perform analysis of the copper tails inflow to the impoundment on a semi annual basis. This data, particularly over time will provide good information on what is happening in regards to acidification of the tailings.

Basis for Specific Permit Conditions

1. Additional Compliance Monitoring Wells - To assure adequate coverage of the existing and expansion portions of the Tailings Impoundment, 5 additional compliance monitoring wells were required. Kennecott provide specifications and locations for these wells and for replacement wells prior to permit issuance. Installation of the new and replacement wells within 180 days of permit issuance is required.

2. Documentation of New and Replacement Well Installations - Kennecott is being required to submit documentation of new and replacement well installations approved in the Division's November 20, 1995 letter within 60 days of completion of the wells.

3. Corrective Action - Please see the discussion on Page 4 of this Statement of Basis for an explanation of the rational for this condition.

4. Assessment of Acidification Potential - Ongoing analysis and testing is being required of Kennecott to assess the potential for the tailings material to acidify Kennecott is required to provide an annual report that compiles the results of each years sampling and analysis.

5. Backfill of Bonneville Clay Incised Areas - A few areas that will be underneath the expansion portion of the impoundment have been incised by surface drainages. Backfilling of these incised areas is required by this condition. Kennecott is being required to submit plans that specify how this will be done.

6. Operational Monitoring Plan - The water quality of interstitial waters within the tailings, waters that are decanted from the top of the impoundment & other outflows such as seeps, and characterization of inflows (this includes ongoing analysis for acid generation potential) will provide information that will assist in predicting potential impacts from the impoundment as well as track changes over time. This condition requires Kennecott to compile the specifics of a plan to monitor these waters.

7. Permit Renewal Application Items - This condition itemizes two of the issues that Kennecott will be required to include in the application for permit renewal to be submitted 180 days prior to permit renewal in the year 2000. These items include water level data for both the shallow and principal aquifer systems in order to observe changes to the potentiometric surfaces of the aquifer systems near the impoundment over time. Additionally, a water quality summary and analysis will be required to assess long term changes to water quality over the life of this structure.

8. Blanket Drain Construction Plans - The design and construction of the blanket drain to be installed in the base of the embankment has a bearing on the reduction of head in the expansion portion of the Tailings. The State Engineer is responsible for review and approval of the blanket drain (and other specifications for the embankment). The Division is requiring Kennecott to provide a copy of the approved plans to be included in the Division's approved specifications for the Tailings expansion. These plans will be a part of the approved BAT for this permit.

9. Closure Plan - Final closure of portions of the existing tailings impoundment may occur as early as 1998. In order to assure that final closure is accomplished in a manner that will protect ground water quality to the maximum extent possible, Kennecott is being required to submit a final closure plan within one year of permit issuance. Some issues that require further study and analysis may be reflected with a schedule for further study in the plan.

10. Update of GCMP - The monitoring portion of the permit requires that Kennecott analyze wells adjacent to the Chevron Phosphate Gypsum Tailings area for radionuclides to include Radium 226 and 228 and Uranium. The current Ground Water Characterization Monitoring Plan does not contain details that specify standard operating procedures, analytical methods, and method detection limits for sampling radionuclides. This condition will require the GCMP to be updated to include this information.

Table A

Water Quality Summary of Tailings Impact to Ground Water

Constituent	Mean Concentrations in Shallow Aquifer	Mean Concentrations in Principal Aquifer	Mean Concentrations in Tailings Waters
pH	7.5	7.6	7.3
TDS	22373	6573	5657
Arsenic	0.043	.071	0.038
Barium	0.137	0.127	0.023
Cadmium	0.002	0.001	0.003
Chromium	0.004	0.004	0.005 (56% ND)
Copper	0.118	0.032	0.023
Lead	0.001	0.001	89% ND
Selenium	0.005	0.006	0.006
Silver	0.002	0.001	94% ND
Zinc	0.022	0.022	0.16

ND - Non Detects

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